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Summary of Uxbridge Fire and Code Compliance Investigation Findings

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THE EVENT

On Saturday, July 21, 2007, at about 4:15 a.m. the Uxbridge Fire Department received a master box fire alarm from the Bernat Mill complex at 19 Depot Street in Uxbridge. Upon arrival, responding fire units found the sprinkler water flow alarm had been activated. Smoke was emanating from the lower level of the building. The fire eventually progressed into a massive blaze requiring the response of seventy-eight communities from Massachusetts and Rhode Island. The fire caused injuries to nine fire fighters. The irregularly shaped mill was three stories in height and was leased by 56 separate companies or businesses. As the fire progressed, all of these businesses were eventually damaged or completely destroyed by the fire. After fire suppression and the cause and origin investigation were concluded, the U.S. Environmental Protection Administration led the mitigation of the hazardous materials present at the scene.

THE INVESTIGATIONS

The Office of the State Fire Marshal led two simultaneous investigations that worked in a complementary fashion but separately: the fire cause and origin investigation and the code compliance and enforcement investigation.

The Fire Investigation

The cause and origin of the fire was jointly investigated by members of the Uxbridge Fire Department, the Uxbridge Police Department, State Police assigned to the Office of the State Fire Marshal and the federal Bureau of Alcohol, Tobacco, Firearms and Explosives. Assistance was received from the State Police Air Wing, Accident Reconstruction Section Crime Scene Services, the Crime Lab, and an electrical expert.

Fire investigators used the scientific methods and standards of the *National Fire Protection Association Standard 921 - Guide for Fire and Explosion Investigations*. They conducted hundreds of interviews and re-interviews, performed and documented exhaustive scene reconstruction and reviewed all available evidence. Consideration was given to other potential ignition scenarios including arson, electrical and equipment malfunction as well as chemical causes.

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POSSIBLE IGNITION SCENARIOS

Area of Origin

Through the internal scene examination, the investigators determined that the fire started in the basement space leased by East Coast Machine. Having determined the area of origin of the fire, investigators systematically eliminated possible ignition scenarios including electrical malfunction, chemical and arson and were left with welding being the most probable cause supported by the evidence.

Electrical Malfunction

Investigators were assisted by an electrical inspector and examined what remained of the wiring and electrical distribution system. No evidence was found of an electrical malfunction as an ignition source.

Chemical Causes

Investigators identified chemicals stored throughout the building and found no evidence that they were involved in the ignition of the fire. No evidence of a vapor explosion or of a spontaneous heating event was found.

Arson

Due to the catastrophic damage to the mill and the fact that the building was poorly secured, an intentionally set fire cannot be conclusively eliminated. Nevertheless, the available evidence does not support an ignition scenario of an intentionally set fire. For example, there was no evidence of ignitable liquids causing the fire.

Welding

Welding is the most probable ignition scenario and is supported by all the evidence from the forensic scene examination and witness statements. East Coast Machine regularly conducted welding in an environment that did not meet the safety requirements of the fire code and for which no permit had been obtained from the fire department. Welding had caused small fires in the past that had been extinguished by staff. Welding took place in the area of origin during the workday prior to start of the fire.

Sparks from welding can travel up to 35 feet which is why the fire code states that no cutting or welding shall take place near walls, partitions, ceilings or roofs of combustible construction unless fire shields or guards are provided to prevent ignition. Unprotected Class A combustibles, such as paper, cardboard, and wood, were in the area of origin. This area had no protective shields and the combustible materials were less than 35 feet from where the welding took place. A spark could have landed anywhere and started a smoldering fire. Investigators believe the fire smoldered undetected for many hours before there was any visible sign of the fire.

An employee reported smelling smoke unlike cigarette smoke after welding had concluded on July 20, 2007 in the hall near East Cost Machine but did not find any source or cause for concern.

The fire code requires someone to stay in the area of welding for at least 30 minutes after welding is concluded (a fire watch) as a fire precaution and that did not occur on July 20, 2007.

Because of the high risk of fires from welding, the state fire code requires a permit from the local fire department. No permit nor verbal or written approval for welding had been obtained from the local fire department. The fire department did not have the opportunity to inspect the area where welding would occur, or to require the erection of fire resistant shields or guards or any other fire precautions.

The Code Compliance & Enforcement Investigation

In addition, the Code Compliance and Enforcement Unit of the Office of the State Fire Marshal conducted an investigation into why a fully sprinklered building suffered such extensive damage. They were assisted by the Uxbridge Fire Department and the Uxbridge Building Department.

Key Findings

There are three important findings of the code compliance and enforcement unit's investigation that contributed to this fire:

- 1) welding regularly occurred in the building without a permit and in violation of the safety standards set forth in the state fire code;
- 2) the sprinkler system in the area of origin had been rendered inoperable allowing the fire to grow and spread uncontrolled;
- 3) no so called *Article 34 Review* of the building had been conducted as part of the conversion and revitalization of the old mill building.

Preserving Our Past; Protecting Our Present

Massachusetts has a great industrial history. Large mill buildings are a legacy of that time. As more and more manufacturing operations downsize or relocate, these buildings become available for reuse. If allowed to remain vacant or abandoned, these buildings pose a large threat to neighborhoods and firefighters. The Bernat Mill is another instance of a building whose occupancy changed without full compliance with the requirements of the State Fire Code and State Building Code. If these buildings are properly reviewed and permitted by local building and fire officials prior to being renovated, these properties can be turned back into thriving businesses that help stimulate the economic growth of the Commonwealth of Massachusetts, as well as the local cities and towns. The Office of the State Fire Marshal has become aware of several cases of mills being converted without the proper review that would ensure public safety and protect these sizeable public and private investments.

Article 34 Review

When a building undergoes a significant change in use, such as going from a mill to a mixed use building, or when a tenant space changes use group classification, the State Building Code requires what is called an “*Article 34 Review*” as part of the issuance of the building permit. This review is an evaluation of the existing building, larger than 35,000 cubic feet, in sufficient detail to determine if any changes are needed to the structure itself, the means of egress, the fire protection systems, the energy conservation systems, the lighting and ventilation of the spaces under construction or of the entire building. No reports were found on file from such a review.

Renovation Work Done Without Permits

It is the responsibility of the appropriate party, the owner or manager, to make application for the permits required to conduct their business, or when they change the use or occupancy of the building. The application for a permit, allows the regulating agency to attach conditions to a permit or to review applicable safety precautions.

The Uxbridge building inspector believes that numerous renovations had occurred within this mill throughout the years, much of it not properly permitted. Building department records revealed permits had been obtained for recent hallway renovations, construction of an office space and showroom, dividing walls, erection of an exterior sign, gas fitting/plumbing and electrical work.

The fire department records showed there was a 1986 permit to remove underground storage tanks, a 1990 tank removal permit, a 1997 fuel oil storage permit, and two sprinkler modification permits in 2004. A permit for sprinkler work had been taken out the day before the fire but no work had yet started on this project.

Sprinklers

The entire building was protected by a pipe schedule designed sprinkler system, both wet and dry, with water being provided from the municipal water system. An 8-inch water main fed the sprinkler system from Mendon Street. Each zone of the sprinkler system had its water flow alarm tied into the fire alarm system, which would in turn activate the master box if water flowed through the sprinkler pipe. According to records reviewed, the sprinkler system had not been maintained by a qualified sprinkler company for many years. All sprinkler flow tests, annual dry valve drip tests and drain tests were conducted by employees of the Carlito Group LLC or Capron Corp. None of these workers were licensed by the state Department of Public Safety.

The date of the last sprinkler inspection on record was July 14, 2005. Many of the sprinkler heads found throughout the building dated back to the 1940s and should have been replaced after being in service for 50 years. This is the sort of issue that presumably would have been addressed if licensed individuals had been conducting the regular maintenance on the system.

Sprinkler Renovations

There had been some renovations to the sprinkler system in recent years, including a major upgrade in the space occupied by Foam Concepts. They manufacture expandable plastics and were separated from the main mill building by a brick firewall. Another tenant, Flanagan Interiors, located on the second floor had additional sprinkler heads installed as part of the installation of a large spray booth. Records indicate the sprinkler system was working properly after these renovations.

MGL Chapter 148, Section 27A requires a permit from the local fire department to shut off, disconnect, remove, or destroy any part of a sprinkler system. 527 CMR 1.00 requires notification to the fire department for any portion of the sprinkler system to be shut down and inoperable. No such permit had been applied for or received, and no notification had been made to the fire department. Investigators found the control valve on Zone 6 of the sprinkler system had been padlocked “closed” at the time of the fire. This zone protected businesses on the first, second and third floors including the area of fire origin.

Welding

East Coast Machine specializes in the custom fabrication of specialty metals for the robotics industry as well as other custom metal work. Cutting and welding operations had been taking place in this business the day prior to the fire. No permits had been issued by the Uxbridge Fire Department for any cutting and/or welding operations.

The fire code establishes how certain activities such as welding can be conducted in a safe manner and these issues can become part of the permit or discussed at the time the permit is issued. The fire code requires the erection of fire resistant shields or guards at the discretion of the fire department. It prohibits welding within 35-feet of combustibles that have not been protected against the ignition or spread of fire, and that someone remain in the area for at least 30 minutes after welding operations have concluded (a fire watch).

Other Code Violations

No permits had been obtained from the fire department for the storage of LP-gas or for the storage of combustible or flammable liquids (with the exception of one 275-gallon fuel oil tank). Interviews indicate LP-gas was stored on site and used to fuel forklifts in several tenant spaces. One of the other tenants, Prime Materials stored approximately 18,000 –20,000 gallons of combustible liquids. No permits were issued by the Uxbridge Fire Department. Before such a permit could be issued, a license must first be obtained and an annual certificate of registration issued that states that they are exercising that license. The quantity of mineral oil present at the time of the fire would have required both a license and a permit for storage. Records indicate a license had been issued in 1963 and the last certificate of registration had been issued in 1976 or 1979.

The fire code also contains provisions for the safe storage of flammable or combustible liquids. Due to the extent of the fire, code compliance officers were unable to determine whether these requirements had been met prior to the fire or not.

RECOMMENDATIONS**Article 34 Review**

One of the recommendations of the code compliance and enforcement investigation report is that the importance of a Building Code “Article 34 Review” prior to any construction or change in use should be stressed with developers, realtors, community development and planning agencies, and fire and building departments. Such a review allows everyone in the community to understand what changes to the building or the building’s systems must be made to protect the people who will use the building under the new uses.

Training to Local Fire and Building Officials

Additional training opportunities should be made available to local fire and building departments. Particular emphasis should be placed on Article 34 of the Building Code, licensing and permitting of flammables and combustibles and inspections.

Prevention and Priority

Communities should devote adequate resources to municipal fire prevention activities and municipal building officials.

Welding Permits Required

Anyone engaged in welding operations should contact the local fire department to ensure they have the proper permits and that the area where welding takes place conforms to the fire code. They should also ensure that staff is properly trained in the procedures to be followed for welding to occur safely.

Businesses Using and Storing Flammable Liquids Update Permits and Licenses

Any company using or storing flammable or combustible liquids should ensure their permits, their land license to store, and their certificate of registration are up to date. It is incumbent on the building or company manager to apply for and to renew the appropriate licenses and permits for the work they conduct.